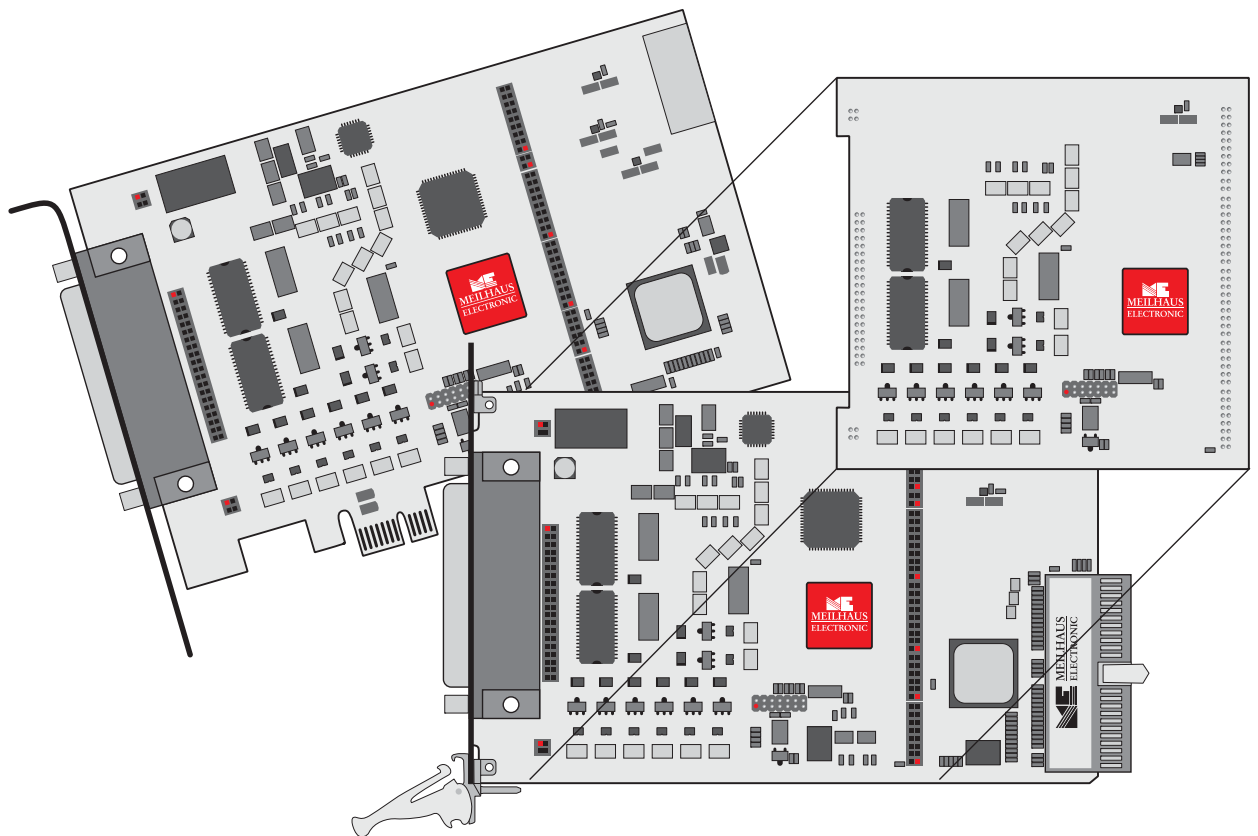


Meilhaus Electronic Manual

ME-5810 1.5E



Opto-isolated Digital-I/O Board
with Bit-pattern Detection, 3 x 16 bit Counters (8254)
(alternative configuration: Frequency Measurement and Pulse Generator)

Imprint

ME-5810 Manual

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Table of Contents

1	Introduction.....	5
1.1	Important Notes	5
1.1.1	Intended Use	5
1.1.2	Improper Use.....	6
1.1.3	Unforeseeable Misuse.....	6
1.2	Scope of Supply.....	7
1.3	Features	8
1.4	System Requirements.....	12
1.5	Software Support	12
2	Initial Operation	13
2.1	Software Installation	13
2.2	Test Program	13
2.3	Fitting the Plug-on Boards.....	14
2.4	Power Supply for PCI-Express Models.....	15
3	Hardware	17
3.1	Block Diagram	17
3.2	ME-5810 cPCI	18
3.3	ME-5810 PCIe	18
3.4	ME-5002	19
3.5	Digital Input/Output	20
3.5.1	Opto-isolated Inputs	20
3.5.2	Opto-isolated Outputs	21
3.5.2.1	Sink Driver	21
3.5.2.2	Source Driver.....	23
3.5.3	External Trigger	25
3.5.3.1	External Trigger Inputs.....	25
3.5.3.2	Edge Detection	25
3.6	Frequency Input/Output	25
3.7	Counters	26
3.7.1	Wiring of the Counters	27
3.7.2	Pulse width modulation	28

3.8	External Interrupt	29
4	Programming	31
4.1	Single Operation Mode	34
4.1.1	Digital Input/Output	34
4.1.2	Frequency Input/Output	35
4.1.2.1	Frequency Measurement	36
4.1.2.2	Pulse Generator	37
4.1.3	Counters (8254)	38
4.1.3.1	Standard Operation Modes	38
4.1.3.2	Pulse Width Modulation	39
4.2	Streaming Operation Mode.....	40
4.2.1	Digital Input/Output	40
4.2.1.1	Stream Timer	40
4.2.1.2	Stream Trigger Sample	40
4.2.1.3	Wraparound Mode	40
4.2.1.4	External Trigger	41
4.3	Interrupt Operation	42
4.3.1	Bit-pattern Change	42
4.3.2	Bit-pattern Compare	44
Appendix		45
A	Specifications	45
B	Pinout	52
B1	78-pin D-Sub (ST1) – ME-5810.....	53
C	Accessories	54
D	Technical Questions.....	55
D1	Hotline.....	55
D2	Service address.....	55
D3	Driver Update	55
E	Index.....	57

1 Introduction

Valued customer,

Thank you for purchasing this device from Meilhaus Electronic. You have chosen an innovative high technology product that left our premises in a fully functional and new condition.

Take the time to carefully examine the contents of the package for any loss or damage that may have occurred during shipping. If there are any items missing or if an item is damaged, contact us immediately.

Before you install the board in your computer, we recommend to read this manual carefully, especially the chapter describing board installation.

The descriptions in this manual apply equally to the PCI-Express and the CompactPCI versions of the ME-5810 series, except where differences are explicitly mentioned.

1.1 Important Notes

1.1.1 Intended Use

The plug-in PC boards of the ME-5000 series are used to acquire and output both analog and digital signals using a PC. The models of the ME-5000 series are for fitting:

- ... in a free PCI Express slot (PCIe) or
- ... in a free CompactPCI slot (cPCI),

according to the type. Please first read the instructions for use of your PC for the procedure to follow when fitting a plug-in board.

Observe the following notes and specifications starting on page 45:

- Make sure that heat can be dissipated from the board well enough inside the PC housing.
- Unused inputs must always be connected to the reference ground of their subdevice, in order to avoid crosstalk between the input channels.
- The partially opto-isolated inputs and outputs provide electrical isolation of the device of up to 1000 V with respect to the PC ground.

- Note that the computer must be switched on first before any voltage is applied to the board through external circuitry.
- Connecting or disconnecting any of the the board's plug-in connectors must always be done when all the components are powered down.
- Make sure that when touching the board, or when plugging in the connecting cable, it is not possible for static discharges to pass through the board.
- Ensure that the connecting cable is securely seated. The plug must be fully inserted into the D-sub socket, and secured using both screws. Only in this way can the board be expected to function properly.

1.1.2 **Improper Use**

Plug-in PC boards for the PCI Express or CompactPCI bus must never be operated outside the PC. Never connect the devices to electrically live parts, and particularly not to any that carry mains voltage.

Make sure that the external circuitry connected to the device cannot come into contact with electrically live parts. Connecting or disconnecting any of the the plug-in connectors must always be done when powered down.

1.1.3 **Unforeseeable Misuse**

The device is not suitable for use as a child's toy, for domestic purposes or under adverse ambient conditions (such as in the open air). The user must take appropriate precautions to avoid unforeseeable misuse.

1.2 Scope of Supply

We do, of course, endeavour to supply you a complete product package. Nevertheless, to make entirely sure that your supply is complete, you can check the contents of your package with the help of the following list.

Your package should contain the following parts:

- Opto-isolated digital-I/O boards for the PCI Express or Compact-PCI bus of type ME-5810A or ME-5810B (incl. ME-5002)
- Manual in PDF format on CD/DVD (optionally available in printed form)
- Driver software on CD/DVD
- 78-pin D-sub mating connector

1.3 Features

The **ME-5810** series PC boards are opto-isolated digital-I/O boards with bit-pattern detection and counters for PCI-Express and CompactPCI systems. In this user manual “ME-5810” is used for all versions of the cards, whereas “ME-5810A” or “ME-5810B” is used to describe special features of these versions.

If required, certain subdevices can alternatively be configured for frequency measurement or for pulse generation (see chapter 4 from page 31). As an option, the base-board can be extended with add-on boards (see table 2 on page 11).

Model overview:

Model	Opto-DIO	Opto-FIO*	Counter
ME-5810A	1 x 16 bit DI 1 x 16 bit DO	4 FI channels 4 FO channels	3 x 16 bit
ME-5810A/S ...with streaming operation	1 x 16 bit DI 1 x 16 bit DO	4 FI channels 4 FO channels	3 x 16 bit
ME-5810B** (ME-5810A + ME-5002)	2 x 16 bit DI 2 x 16 bit DO	4 + 8 FI channels 4 + 8 FO channels	3 x 16 bit
ME-5810B/S** (ME-5810A/S with streaming operation + ME-5002)	2 x 16 bit DI 2 x 16 bit DO	4 + 8 FI channels 4 + 8 FO channels	3 x 16 bit

Table 1: Model overview ME-5810 series

* Alternative configuration can be selected with ME-iDC.

** ME-5810A(/S) is always registered in the Windows device manager.

- **Opto-isolated digital-inputs:** The ME-5810 has 16 opto-isolated inputs. Further 16 opto-isolated inputs can be added using the plug-on board ME-5002. The inputs run with a voltage high-level of 24 V typ. (specifications see page 46).
- **Opto-isolated digital-outputs:** Die ME-5810 has 16 opto-isolated outputs. Further 16 opto-isolated outputs can be added using the plug-on board ME-5002. The source-driver can drive up to 370 mA per pin (all 16 outputs active). The detailed specifications of the sink and/or source drivers can be found on page 46.

The source drivers are short-circuit-proof and are equipped with a current limiting per channel. If required, the output driver can send an interrupt on overload to the PC.

A suitable external source is required to supply the output drivers.

- **Frequency measurement:** With the concept of “configurable subdevices” the subdevice 0 can also be used as a frequency counter. Four independent channels are available to measure the frequency and duty cycle of periodic rectangular signals (max. 5.5 MHz). 8 further channels can be added using the plug-on board ME-5002.
- **Pulse generator:** With the concept of “configurable subdevices” the subdevice 1 can also be used as a rectangular signal generator. Four independent channels are available to output a periodic rectangular signal up to 5.5 MHz with selectable duty cycle. 8 further channels can be added using the plug-on board ME-5002.
- **Sink/source selection:** You can switch the output ports over from sink to source drivers or high impedance by software for an optimal adaption in industrial applications. “High impedance” means that the voltage level at the output pin depends on your external application.
- **Bit-pattern detection:** If required, the bit-pattern at the digital input port can be monitored. Depending on the mode an interrupt can be generated, if the bit-pattern changes or is equal/not equal to a given bit-pattern. In streaming mode bit-pattern detection can be used to control the input/output operation depending on the selected operating mode (no interrupt operation).
- The isolation voltage between the opto-isolated inputs/outputs and PC-ground is 1 kVAC_{RMS}.
- The opto-isolated digital inputs of the ME-5810 and ME-5002 are equipped with an overvoltage protection diode that can discharge voltage pulses to ground for a short period of time.

Due to the DMA architecture data can be transmitted quickly between PC memory and the board. In streaming mode an I/O-rate of 300 kHz can be achieved, shared among all ports (see table 4). The actual transmission rate depends on the operating mode and on the configuration of your PC.

Depending on your application you can select between these **operating modes**:

- **Single:** In this mode a single value can be read or written under software control (see chapter 4.1.1 on page 34).
- **Streaming** (“S” versions only): In this mode data I/O makes use of the FIFO, either under timer control and/or controlled by external trigger signals. Various **trigger options** are available that can be defined as start and stop conditions. Subdevice 0 is defined as a 16 bit input port and subdevice 1 as a 16 bit output port (see chapter 4.2.1 on page 40).
- **Interrupt:** Used for interrupt processing in bit-pattern change and bit-pattern compare mode (see chapter 4.3 on page 42).

Custom specific firmware versions are available on request.

Model	ME-5810	ME-5001	ME-5002	ME-5004
PC interface	cPCI/PCIe	–	–	–
Board type	Base board	Plug-on board	Plug-on board	Plug-on board
DIO channels	1 x 16 bit DI, 1 x 16 bit DO	2 x 8 bit DIO + 4 x 8 bit DIO**	1 x 16 bit DI 1 x 16 bit DO	1 x 16 bit DI 1 x 16 bit DO
Streaming channels*	1 x 16 bit DI, 1 x 16 bit DO	–	–	
I/O rate DI/DO	30MS/s / 30MS/s	–	–	
Frequency FI/FO	300kHz/3kHz	5.5MHz/5.5MHz	300kHz/3kHz	300kHz/3kHz
Ext. trigger for streaming	✓ *	–	–	–
Software start/stop for streaming	✓ *	–	–	–
Frequency measurement	4 channels	8 channels	8 channels	8 channels
Pulse generator	4 channels	8 channels	8 channels	8 channels
Counter (8254)	3 x 16 bit	–	–	–
Bit-pattern change	✓	✓	✓	✓
Bit-pattern compare	✓	–	✓	✓
DI/FI level	12...30V	3.3V/5V (4 x 8 bit***)	12...30V	12...30V
DO/FO level	15...30V	3.3V/5V (4 x 8 bit***)	15...30V	15...30V
Active termination	–	4 x 8 bit***	–	–
Opto-isolation	✓	–	✓	✓
Sink/Source selection	✓	–	✓	✓
Temp. monitoring	source driver	–	source driver	source driver
Field wiring	78pin D-Sub female socket	25pin Sub-D female socket	via 78pin D-Sub of base board	37pin D-Sub female socket
Configurable firm-ware	✓	✓	✓	✓
Configurable sub-devices	✓	✓	✓	✓

Table 2: ME-5810 and plug-on boards in overview

*Streaming mode only for „S“ versions **opt. via ME-AK-D25F/S(cPCI) ***only for subdevice 0..3

1.4 System Requirements

The ME-5000 series requires a PC with an Intel® Pentium® processor, or compatible computer, with a free PCI Express or CompactPCI slot (see also the specifications on page 45). The board is supported by the Meilhaus Intelligent Driver System (ME-iDS) from Windows 2000 upwards (Linux under development).

1.5 Software Support

The ME-5000 series is supported by the Meilhaus Intelligent Driver System (ME-iDS). The ME-iDS is an unified driver system usable across devices and operating systems. It supports Windows 8/7/Vista/XP/2000 (Linux under development) and contains a universal function library (API) for programming.

You will find a detailed description of the functions in the ME-iDS manual, a copy of which is on the CD/DVD supplied.

Please also observe the notes in the appropriate README files.

2 Initial Operation

Please read your computer manual instructions on how to install new hardware components **before installing the board**.

2.1 Software Installation

- **Installation under Windows**

The following basic procedure should be used:

If you have received the driver software as an archive file please un-pack the software **before installing the board**. First choose a directory on your computer (e. g. C:\Temp\Meilhaus\ME-iDS).

Use the Meilhaus Intelligent Driver System (ME-iDS) for programming your new data acquisition hardware. For installation and operation of the driver system please follow the documentation in electronic form included with the software package.

- **Installation under Linux**

Note the installation instructions included with archive file of the appropriate driver.

Linux under development!

2.2 Test Program

- **ME-PowerLab³**: Run the program from the Windows Start menu. This will allow you to test all the important functions of the hardware.
- You will find **simple test programs** in the SDK of the ME-iDS, in the "Test Executables32" or "Test Executables64" subfolders.

2.3 Fitting the Plug-on Boards



The boards should be handled with care in order to make sure that the device is not damaged by electrostatic discharge (ESD), mechanical stress or unsuitable current surges. Precautions should also be taken to avoid an electric shock. Ensure that standard ESD safety precautions are taken. At least one hand should be grounded in order to dissipate any static charge.

Observe the following procedure:

1. If the base board is installed, you must first remove it in order to be able to insert the plug-on board. Here you should observe the procedure as described in the manual for your PC system.
2. Make sure that electrostatic discharges cannot take place through the plug-on board or the base board as you plug it in. Follow the standard ESD safety precautions.
3. Push the plug-on board carefully, and with only a little force, on to the male connector provided for it (see diagram 1, items 1, 2 and 3). Check that the board is fully plugged in.
4. Choose two adjacent slots for the installation. If necessary, remove an additional blanking plate for the slot of the plug-on board.
5. Carefully plug the combination of the base and plug-on board into the computer.
6. Screw the two slot brackets down firmly.
7. Close the PC system again.

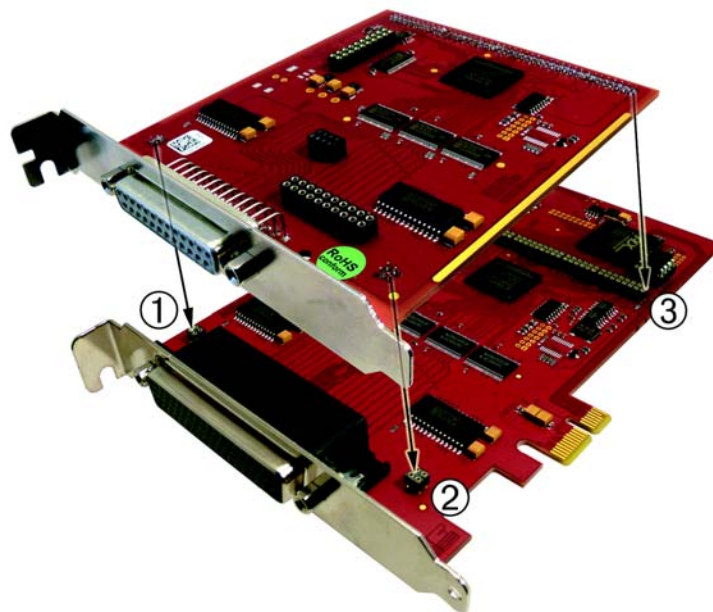


Diagram 1: Fitting the plug-on boards

2.4 Power Supply for PCI-Express Models

Because of the PCI-Express slot drives not sufficient current for operation of the board, an additional supply is required via the PC power supply. For that purpose connect a free „MOLEX“ connector of the PC (also as used for power supply of drives) with the appropriate terminal of the board (see the following diagram). Else the board can be irreversible damaged!

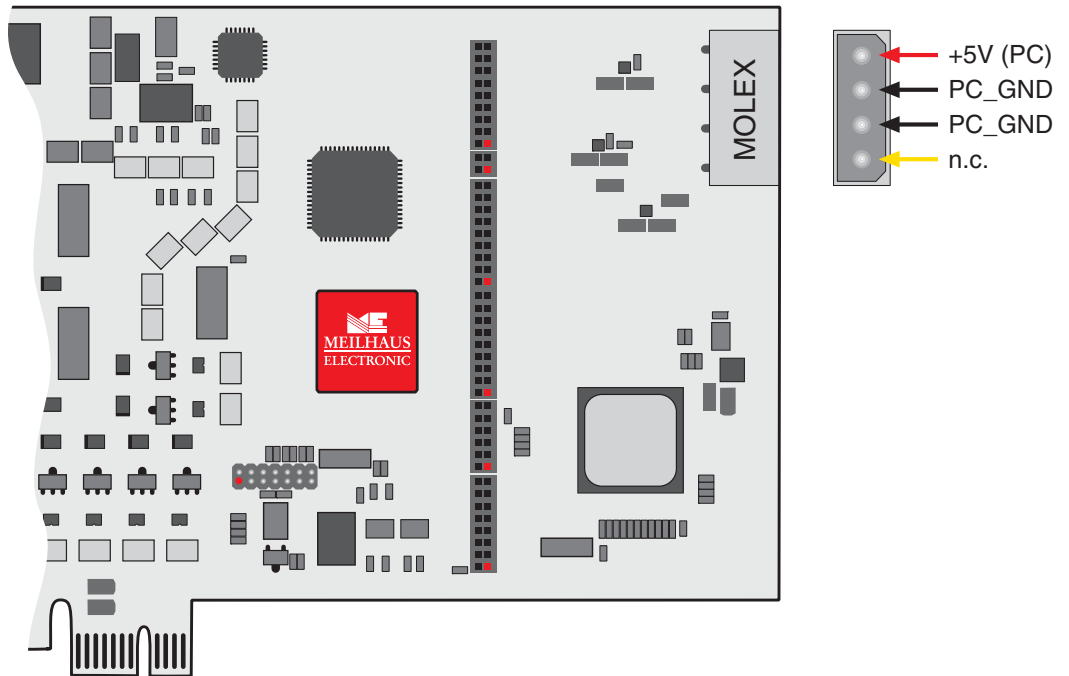


Diagram 2: Additional power to the PCI Express models

3 Hardware

3.1 Block Diagram

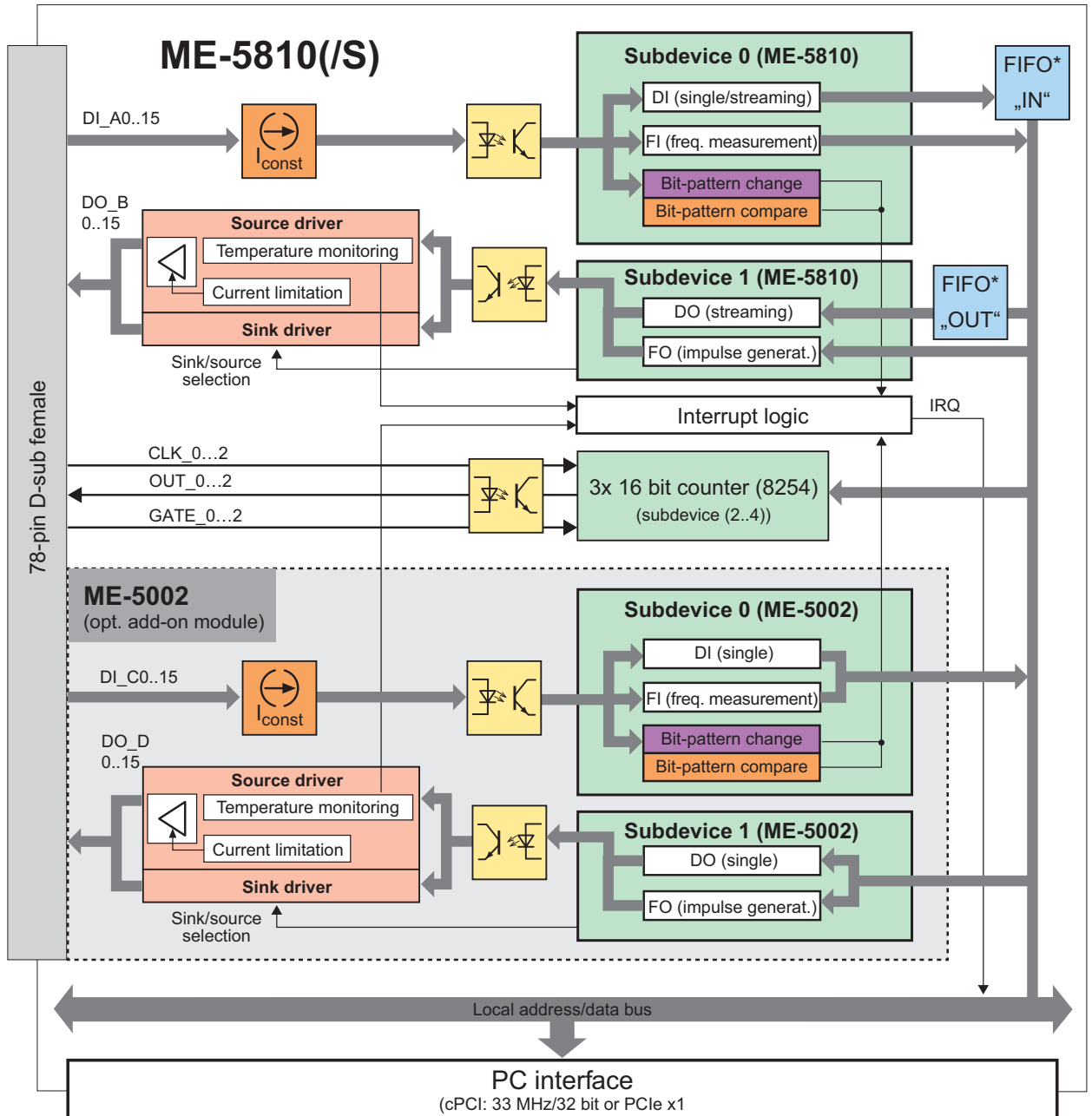


Diagram 3: Block diagram of ME-5810

***Note:** „FIFO IN“ and FIFO OUT“ for streaming mode are only available on „S“ versions.

Pinout diagram of the 78-pin D-sub female connector in the appendix (see „Pinout“ on page 52).

In the following chapters you will learn more about the external wiring of the functional sections. Chapter 4 from page 31 describes the operation modes and the programming.

3.2 ME-5810 cPCI

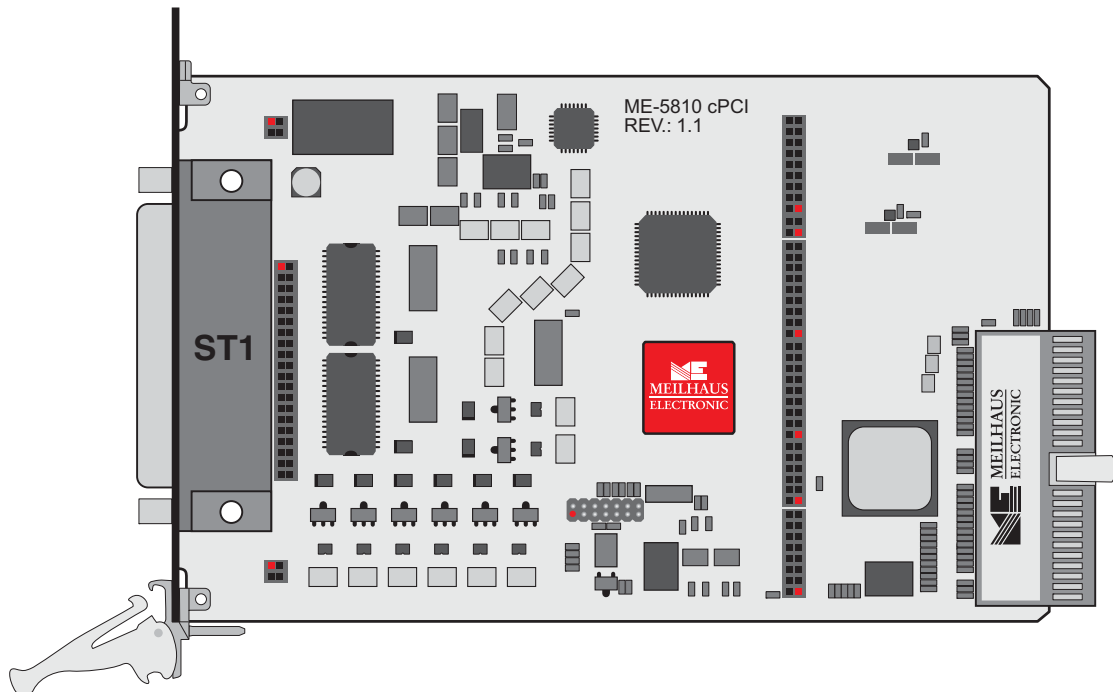


Diagram 4: ME-5810 cPCI

3.3 ME-5810 PCIe

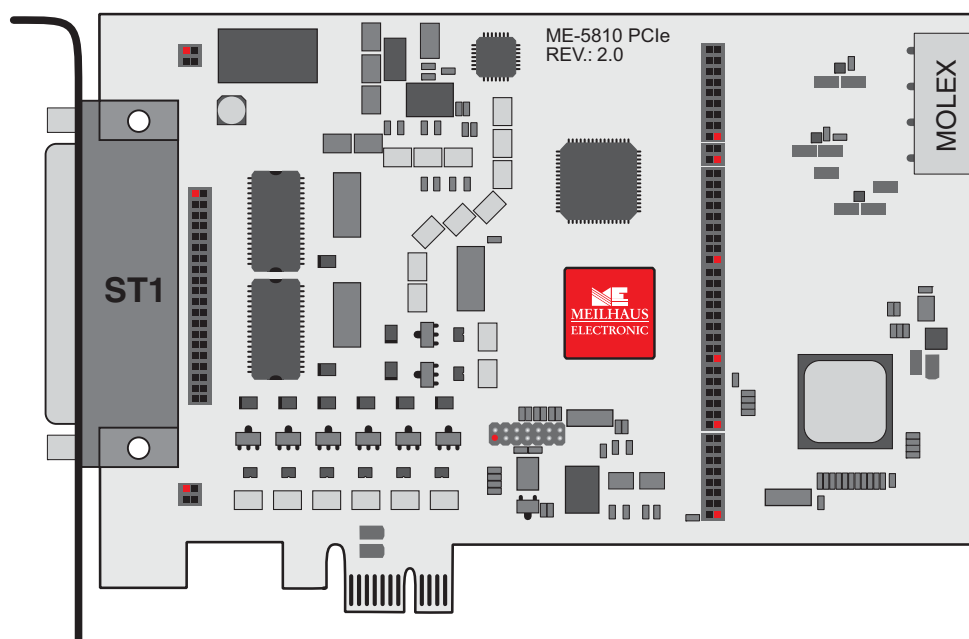


Diagram 5: ME-5810 PCIe

3.4 ME-5002

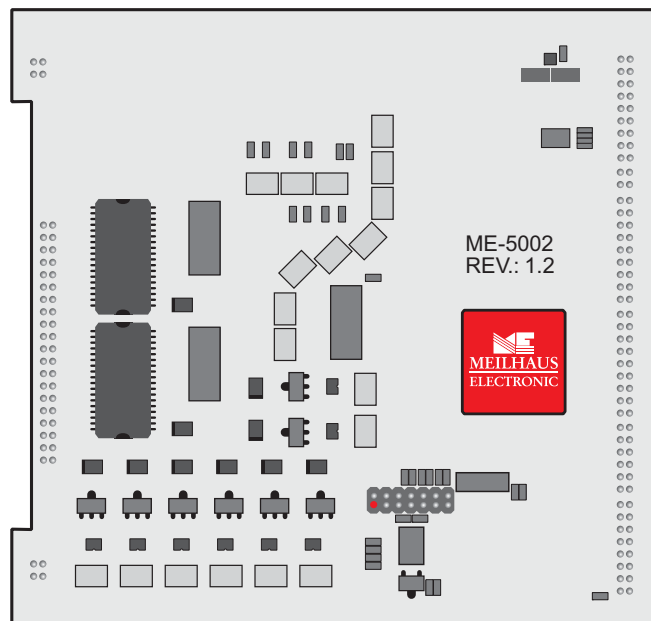


Diagram 6: ME-5002

3.5 Digital Input/Output

The ME-5810 series opto-isolated ports have been designed for applications in industrial control applications (typ. 24 V). An external power supply (pin: VCC_EXT) is required for the opto-isolated digital outputs. Depending on the application, the drivers of the output ports can be configured as sink or source or high impedance via software. The isolation voltage to PC-ground is 1000 VAC_{RMS}.

The ME-5810 series base board has 16 opto-isolated inputs (port A) and 16 opto-isolated outputs (port B). In combination with the plug-on board ME-5002, 16 further opto-isolated inputs (port C) and 16 opto-isolated outputs (port D) can be added. Due to the opto-isolation, the port direction is fixed.

In streaming mode ports A and B share the bandwidth for the data transfer between board and PC. The bandwidth depends on the configuration of your PC – a total data throughput of up to 30 MS/s is realistic (see also table 6).

The programming of the various operating modes is described in chapter 4.1 from page 34.

3.5.1 Opto-isolated Inputs

The ME-5810 has 16 opto-isolated inputs (port A). In combination with a plug-on board ME-5002, 16 further opto-isolated inputs (port C) can be added.

The inputs have been designed for an input high-level $U_{in,H} = 24\text{ V}$ typ. A reference to the ground of the external circuitry via GND_EXT (pins 9, 11, 59) has to be setup in any case. The input lines show logic “0” if not connected.

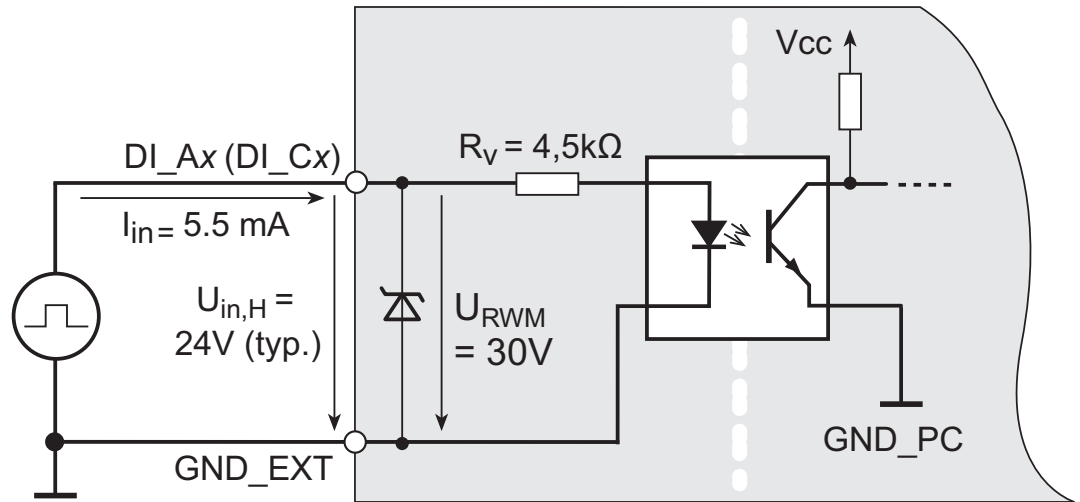


Diagram 7: Inputs of the ME-5810

The opto-isolated digital-inputs of the ME-5810 and ME-5002 are protected from overvoltages with special Z-diodes, so called Transient Voltage Suppressor diodes (TVS diodes). These diodes can discharge short voltage pulses with U_{RWM} (Reverse Working Maximum) greater than 30 V to ground (max. 600 W pulse power at a pulse width of 1 ms).

3.5.2 Opto-isolated Outputs

The ME-5810 has 16 opto-isolated outputs (subdevice 0). In combination with an plug-on board ME-5002, further 16 opto-isolated outputs (subdevice 0) can be added.

The ME-5810 and ME-5002 output ports are equipped with special driver chips that allow a selection of sink and source via software. Depending on the application, the user can switch between low-active outputs (sink driver = standard setting) and high-active outputs (source driver) via software. Moreover, the output ports can be set to high impedance. A reference to the ground of the external wiring via GND_EXT (pins 9, 11, 59) has to be setup in any case.

3.5.2.1 Sink Driver

Each output port is equipped with two sink driver chips of type ULN2803; detailed specifications see page 46.

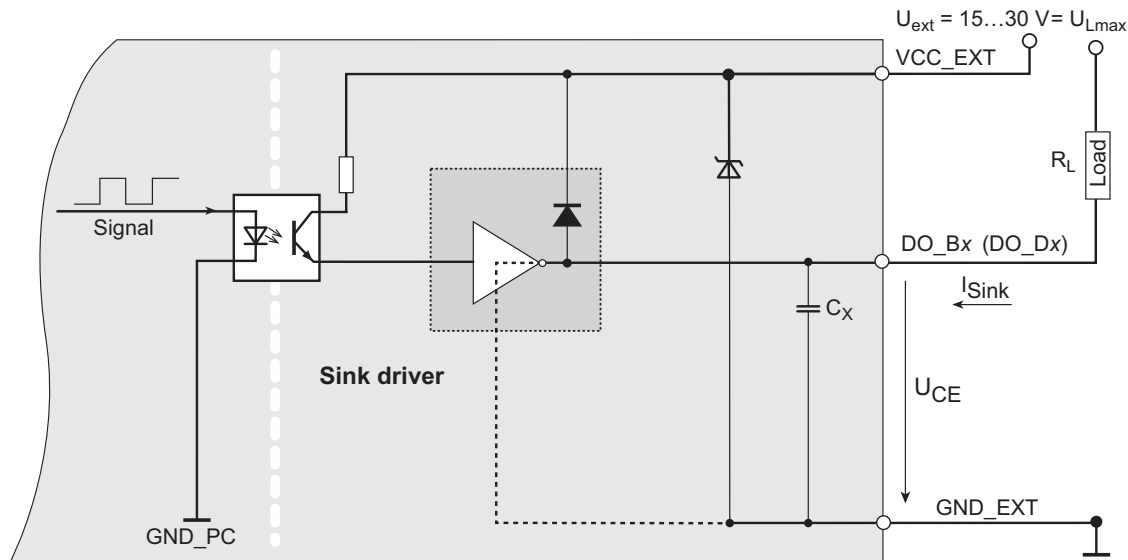


Diagram 8: ME-5810 outputs with sink drivers

The maximum current per output ($I_C = I_{\text{Sink}}$) depends on the saturation voltage U_{CE} and is limited by the power loss of the sum of the channels on $P_{\text{tot}} = 1 \text{ W}$ per chip (DO_x 0...7 = chip 1, DO_x 8...15 = chip 2), see diagram 9 and 10.

$$P_{\text{tot}} = P_0 + \dots + P_7 \leq 1 \text{ W (per chip at } 70^\circ\text{C)}$$

$$\text{with } P_0 = I_{C0} \cdot U_{CE0}$$

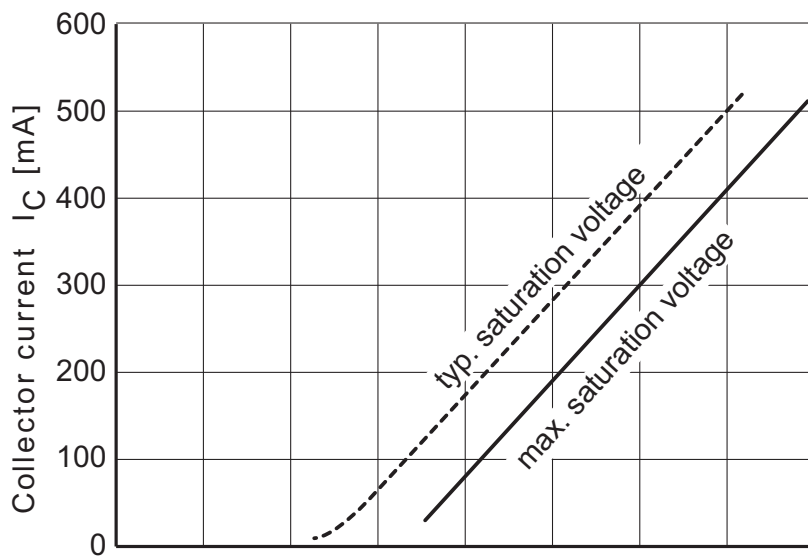


Diagram 9: Collector current against saturation voltage

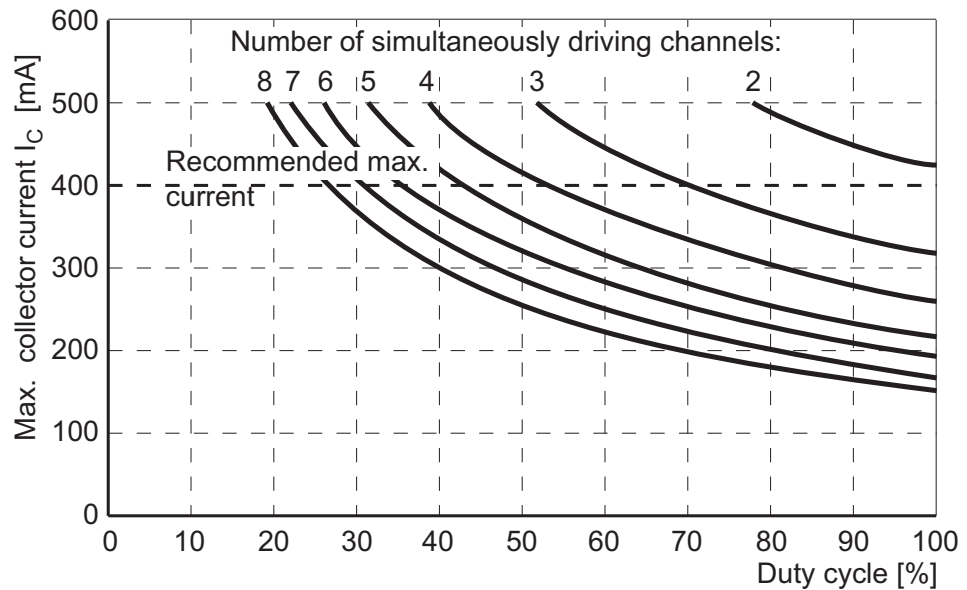


Diagram 10: Collector current against duty cycle and number of active channels in use

To supply the sink output drivers, an external power supply has to be connected to VCC_EXT (Pin 10, 20) with sufficient power (depending on the application). At full load this means min. 0.8 A for the ME-5810A and min. 1.6 A for the ME-5810B.

3.5.2.2 Source Driver

Each input port is equipped with two source driver chips of type ISO1H811G; detailed specifications see page 46.

The source output drivers are short-circuit-proof and are equipped with a current limiting per channel. The combination of current limiting, thermal shutdown, and automatic re-start protects the circuitry against overload. In the case of an overload condition ($T_{TSD} = \text{typ. } 175^\circ\text{C}$) the related channel will switch off and on again automatically, as soon as the junction temperature has fallen below the threshold of $T_R = 135^\circ\text{C}$. If a chip temperature of typ. 130°C is still exceeded, the overloaded channel remains disabled and is only reactivated, if the temperature decreases below $T_{CR} = 110^\circ\text{C}$. Channels in standard (no overload) condition can be used at any time without restrictions. In the case of an overload condition the output driver (per port) can send an interrupt to the PC. A further security feature is a complete disabling of a port in case of a missing ground connection.

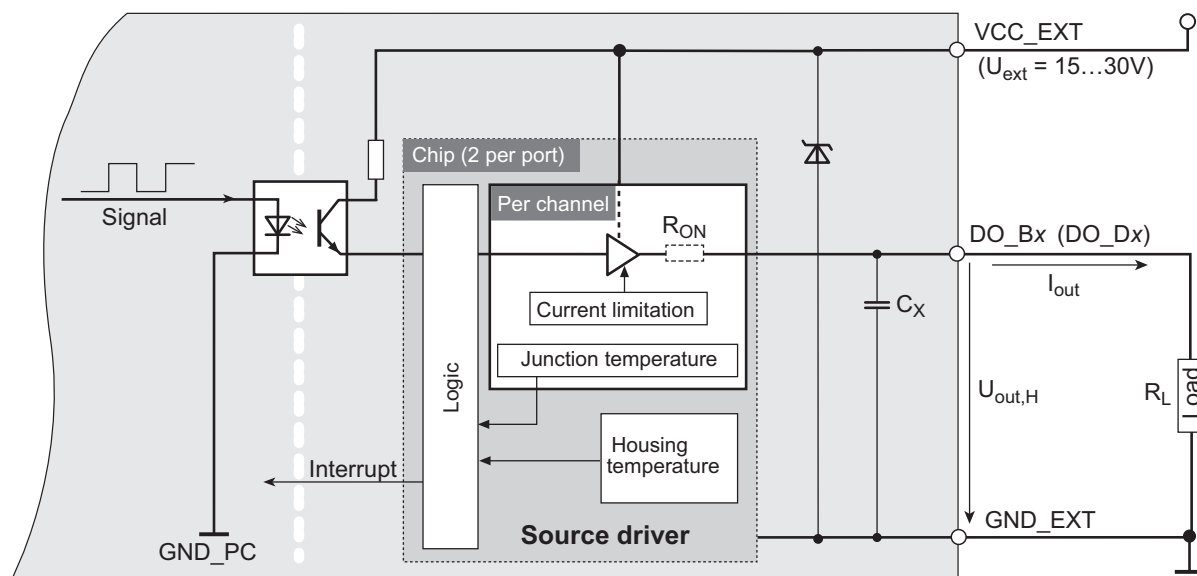


Diagram 11: ME-5810 outputs with source drivers

The following table shows the maximum output current I_{Out} in dependency of the number of channels in use:

Number of channels used	1	16	32
I_{Out} [A]	0.625 A	0.370 A	0.180 A

Table 3: Max. current of the source drivers

To supply the source output drivers, an external power source has to be connected to VCC_EXT (pin 10, 20), with sufficient power (depending on the application). At full load this means minimum 6 A for the ME-5810A/B. The output voltage $U_{\text{out,H}}$ can be calculated like this:

$$U_{\text{out,H}} = U_{\text{ext}} - (R_{\text{ON}} \cdot I_{\text{out}})$$

3.5.3 External Trigger

3.5.3.1 External Trigger Inputs

Each digital input can be used as a trigger input. The trigger conditions for start und stop of an I/O under timer control (streaming mode operation on “S” versions) can be configured in a very flexible way. Also see diagram 12 on page 25 as well as picture 19 on page 41.

Note: In single mode operation I/O cannot be triggered externally. See chapter 4.3 on page 42.

3.5.3.2 Edge Detection

Any digital input can be configured to start an operation on a rising, a falling or any edge (i.e. both rising/falling edge)



Diagram 12: Trigger edges

3.6 Frequency Input/Output

With the concept of “configurable subdevices” on the ME-5000 series boards you can use certain subdevices with an alternative functionality. The configuration tool ME-iDC is used to change the configuration before the user application is started.

The following channels are available:

- **Frequency measurement** (FI = “Frequency Input”):
4 independent inputs for measurement of frequency and duty cycle of periodic rectangular signals (max. 300 kHz). 8 further channels can be added using the plug-on board ME-5002.
- **Pulse generator** (FO = “Frequency Output”):
4 independent outputs for a periodic rectangular signal up to 3 kHz with a selectable duty cycle. 8 further channels can be added using the plug-on board ME-5002.

The related pins are marked with FI_x and FO_x in the pinout diagram on page 24. The remaining I/O-channels of the digital-ports cannot be used in this configuration.

Note: For the configuration “pulse generator” (FO) take care of the level at the unused pins DO_B4..15 (ME-5810) and DO_D8..15 (ME-5002). When used as sink drivers the channels are high impedance, when used as source drivers they are connected to ground!

The specifications of the digital-I/O ports also apply to the FI/FO lines. A reference to the ground of the external circuitry via GND_EXT (pins 9, 11, 59) has to be setup in any case.

The frequency counters and pulse generators are configured via software. Chapter 4.1 on page 34 describes the programming of the frequency-I/Os.

3.7 Counters

A standard counter chip of type 82C54 is used on the ME-5810 series boards. This versatile chip has 3 independent 16 bit (downward) counters. All counter signals are available at the D-sub female connector.

With a suitable enabling of the GATE input (0 V) the related counter will start downward-counting with negative edge control. The counter clock (CLK) has to be supplied externally and can be max.10 MHz. With a suitable external wiring the counters also can be cascaded.

All counter signals (CLK, GATE, and OUT) are opto-isolated. The counter inputs have been designed for 24 V ($R_v = 3k\Omega$) as used in industrial control applications. When the counters are used, U_{ext} has to be in the range of 24..30 V. The counter outputs are equipped with pull-up resistors ($R_{UP} = 4,7k\Omega$).

The programming of the timers is described in chapter 4.1 on page 34.

3.7.1 Wiring of the Counters

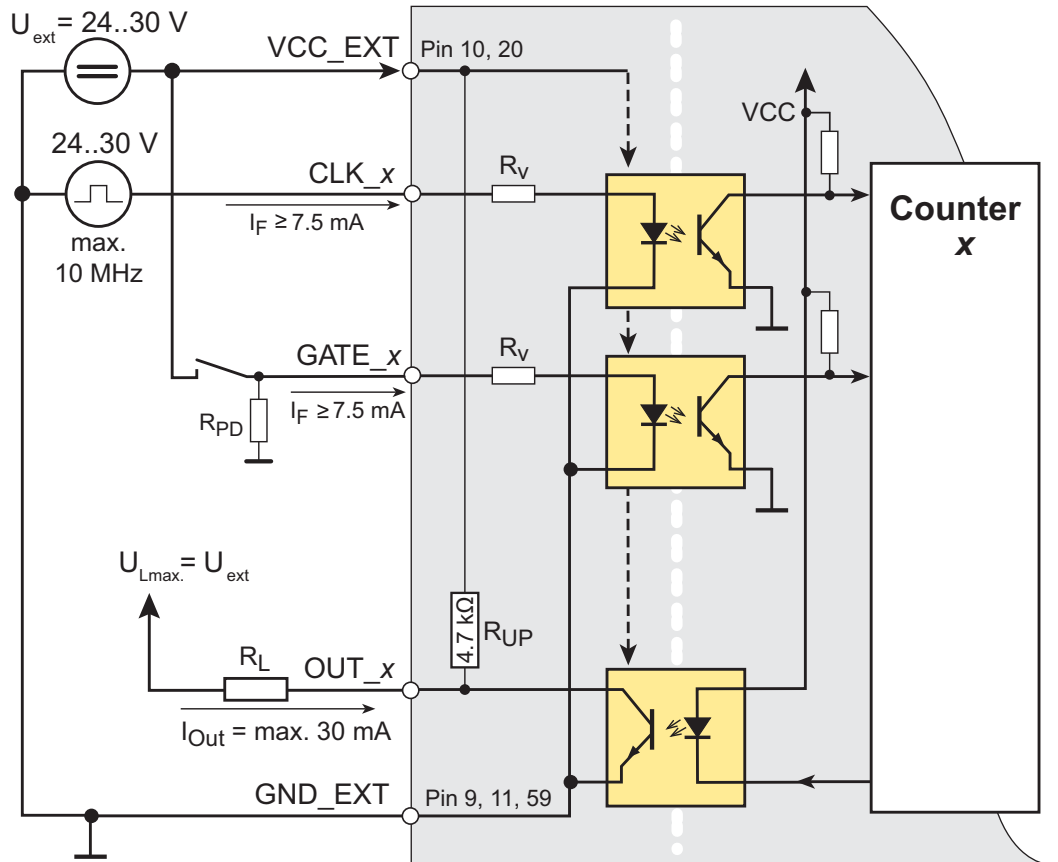


Diagram 13: Wiring of the counters

Notes:

- Output OUT_2 is designed as an “Open Collector” output, i.e. as soon as the output is conducting (logic “1”), the load R_L is connected to ground (GND_EXT). Logic “0” means that the output is in a high impedance state.
- The polarity of the input signals (CLK_x and GATE_x) is inverted by the opto-couplers.
- All counter signals require a reference to external ground GND_EXT (pins 9, 11, 59).
- The inputs CLK_x and GATE_x have been designed for a voltage level of +24V ($R_V = 3k\Omega$). Note for I_F : $7.5mA \leq I_F \leq 10mA$.
- The max. output current of opto-isolated versions may not exceed $I_{Out} = 30mA$.

3.7.2 Pulse width modulation

Pulse width modulation (PWM) is a special application of the counters. With the suitable external wiring a signal with a variable duty cycle can be generated with the help of counters 0...2. The duty cycle can be varied in the range of 1...99% in steps of 1%. The prescaler has to be sourced with an external base clock of max. 10 MHz. This results in a max. output signal frequency of 50 kHz. Diagram 14 shows the external wiring to be used with the functions *meUtilityPWMStart/Stop* (see also ME-iDS manual).

Use this formula to calculate the frequency f_{OUT_2} :

$$f_{OUT\_2} = \frac{\text{Base clock}}{\text{<Prescaler>} \cdot 100} \quad (\text{with } \text{<Prescaler>} = 2 \dots (2^{16} - 1))$$

The following diagram shows the external wiring of the counters for the ME-5810.

For programming the PWM output please read the ME-iDS user manual and the ME-iDS help file (see ME-iDS Control Center).

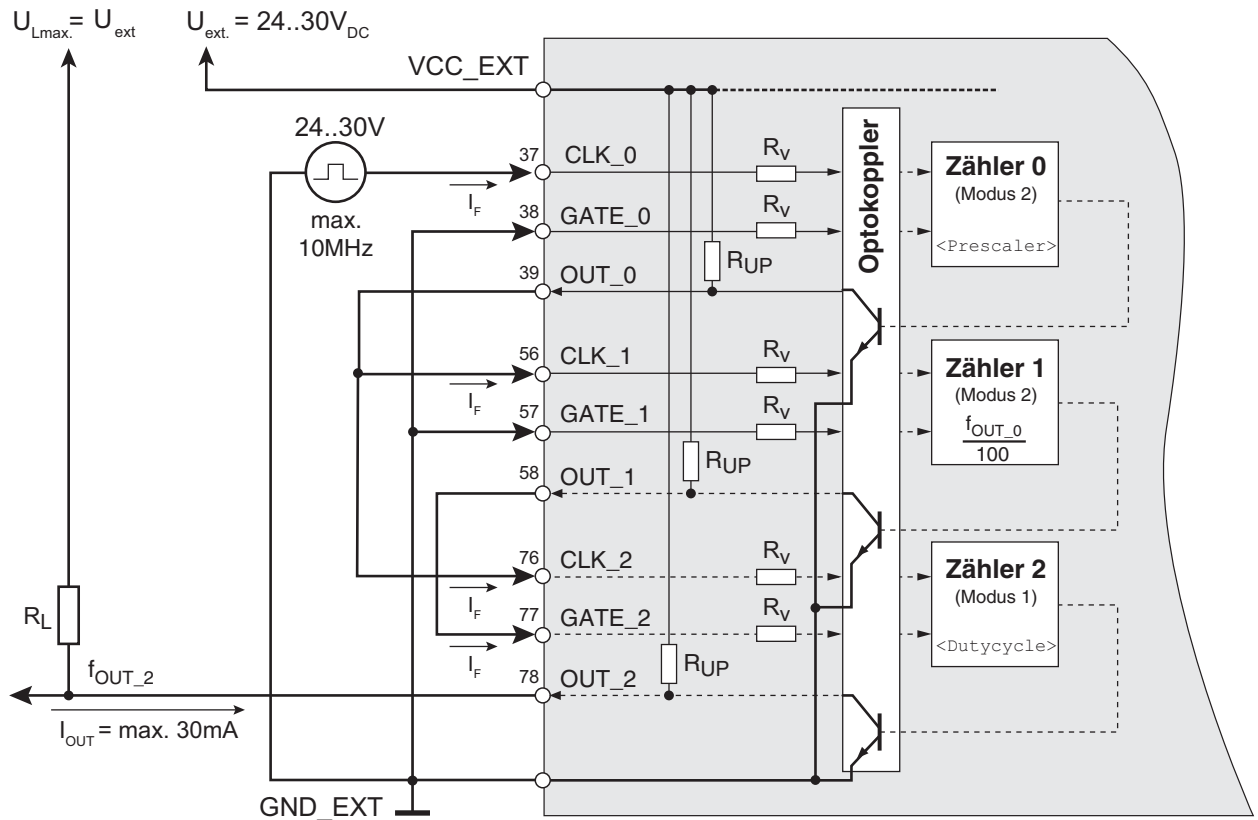


Diagram 14: PWM wiring ME-5810

3.8 External Interrupt

If required, you can also monitor the bit-pattern of a digital input port. You can select one of the modes “bit-pattern change” and “bit-pattern compare”. As soon as the specified event occurs, an interrupt is issued and passed directly to the PC.

The digital inputs/outputs are programmed in the single operating mode. The interrupt handling is carried out with the *meIOIrq...* functions; see also chapter 4.3 on page 42.

4 Programming

The Meilhaus Intelligent Driver System (ME-iDS) is included with the device for programming purposes. The ME-iDS is a unified driver system usable across devices and operating systems. It supports Windows 2000 and above, as well as Linux systems (in preparation) with Kernel 2.6 and above, and contains a universal function library (API) for all common programming languages. (You can find the scope of the current software support in the readme files of the ME-iDS.)

A detailed description of the functions can be found in the ME-iDS manual (see the CD/DVD included with the board, or online under: www.meilhaus.com/download). Other details, such as the assignment of the subdevices and device-specific arguments, may be found in the help file (in the help file format under Windows, *.chm), which you can open via the "ME-iDS Control Center" in the information area of the taskbar (usually at the bottom right of the screen), or through the Windows Start menu.

The ME-5810 series base boards are devices with five subdevices, beginning with index "0". When using plug-on boards (e.g. ME-5002) these appear as individual devices and subdevices, beginning with the index "0". The functionality of the subdevices can be selected by the user from a list of predefined configurations. The desired configuration has to be selected with the configuration tool ME-iDC before the user application is started. With the standard configuration (ID 0) the board is ready-to-use at once. The following tables show an overview of the configurations available:

Base boards ME-5810A(/S)

Subdevice of type...	...subtype	I/Os	ID of the configuration
Subdevice 0 (DI, FI)			
Digital input (DI) (ME-5810A)	Single	16 bit port	0*
Digital input (DI) (ME-5810A/S)	Streaming	16 bit port	0*
Frequency input (FI)	Single	4 channels	1
Subdevice 1 (DO, FO)			
Digital output (DO) (ME-5810A)	Single	16 bit port	0*
Digital output (DO) (ME-5810A/S)	Streaming	16 bit port	0*
Frequency output (FO)	Single	4 channels	1
Subdevice 2..4 (Counters, Type 8254)			
3 x Counter (CTR)	Single	3 x 16 bit	0*

Table 4: Subdevice configuration ME-5810

Plug-on board ME-5002 (included with ME-5810B(/S))

Subdevice of type...	...subtype	I/Os	ID of the configuration
Subdevice 0 (DI, FI)			
Digital input (DI)	Single	16 bit port	0*
Frequency input (FI)	Single	8 channels	1
Subdevice 1 (DO, FO)			
Digital output (DO)	Single	16 bit port	0*
Frequency output (FO)	Single	8 channels	1

Table 5: Subdevice configuration ME-5002

***Standard configuration** at shipment. The most recently selected configuration in the ME-iDC is stored in a non-volatile memory on the board, and is automatically loaded after a restart.

Depending on your application you can choose one of the following **operating modes**:

- **Single**: In this mode single values can be read or written.
- **Streaming** (only for the versions “S”): In this mode data-I/O is done via FIFO. The timing can either be controlled by a timer and/or external trigger signals. Various trigger options are available which can be defined as start and stop conditions, see chapter 4.2.1 on page 40.
- **Interrupt**: For interrupt processing in the modes bit-pattern change and bit-pattern compare (see chapter 4.3.1 from page 42).

Operating mode	Speed	Trigger
Single	Single value	input/output by software
Stream-Timer ...with Option „Wraparound“	$f_{\text{Input signal}}$: bis 300 kHz $f_{\text{Output signal}}$: bis 3 kHz	start/stop by software or external trigger
Stream-Trigger-Sample	$f_{\text{Input signal}}$: bis 300 kHz $f_{\text{Output signal}}$: bis 3 kHz	Sstart/stop by software or external trigger
Interrupt (Bit-pattern detection)	$f_{\text{IRQmax.}} = 10 \text{ kHz}$	Ext. trigger signal at a digital I/O port

Table 6: Operating modes overview

Detailed timing diagrams can be found in the ME-iDS manual.

4.1 Single Operation Mode

Individual values can be read or written in this operating mode.

Notes:

- The digital-I/O channels direction is determined by the ME-5810 series hardware (opto-couplers).
- In power-down state and after switching on the PC all outputs are in a high impedance state. Only if “1” is written, the output changes to conductive.
- A port that is configured as an output can also be read back!

4.1.1 Digital Input/Output

ME-5810	ME-5001	ME-5002	ME-5004	
✓	✓	✓	✓	

For input/output of individual digital values the single operation mode is used. The subdevices are defined as follows: subdevice 0 of the ME-5810 always is of type ME_TYPE_DI and subdevice 1 of type ME_TYPE_DO. The subtype of the subdevice is ME_SUBTYPE_STREAMING for the ME-5810/S, otherwise ME_SUBTYPE_SINGLE.

If the plug-on board ME-5002 is used, its subdevice 0 is of type ME_TYPE_DI and subdevice 1 of type ME_TYPE_DO.

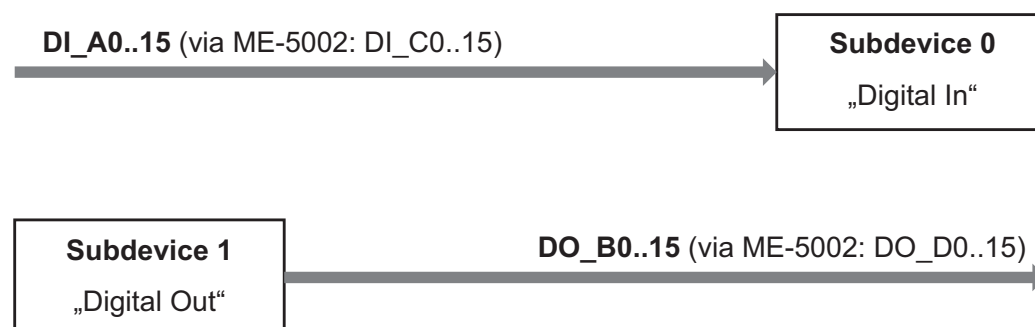


Diagram 15: Digital input/output in single operation mode

Please observe the ME-iDS manual and the ME-iDS help file (*.chm) for the **procedure**. You can open both these documents through the "ME-iDS Control Center) or through the Windows Start menu.

Please read chapter 3.5 on page 20 for the wiring of the digital ports.

4.1.2 Frequency Input/Output

ME-5810	ME-5001	ME-5002	ME-5004	
✓	✓	✓	✓	

Before you can use the "Frequency measurement" or "Pulse generator" modes, it is necessary, before opening your application, to run the ME-iDC configuration tool in order to specify the configuration for the corresponding subdevice (see also Table 4 on page 32).

The programming of the frequency measurement and the pulse generator is always done in the **single** operation mode. The subtype of the sub-devices is always ME_SUBTYPE_SINGLE.

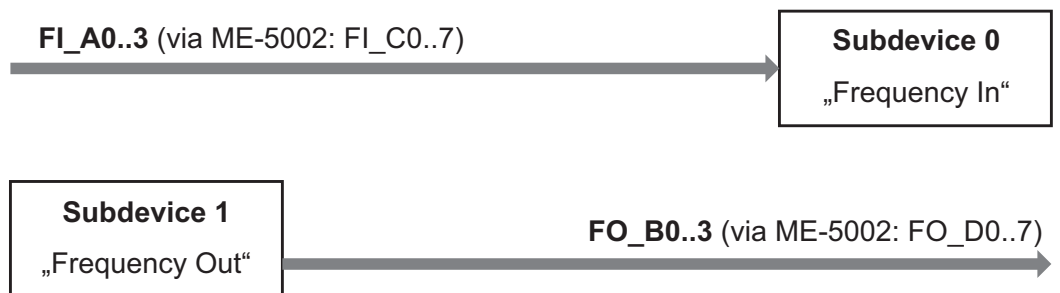


Diagram 16: Frequency input/output in single operation mode

Please read the ME-iDS manual and the ME-iDS help file (*.chm) carefully prior to programming. You can open both of these documents through the "ME-iDS Control Center" or through the Windows Start menu.

Two variables are introduced to describe the rectangular signal, and apply equally to input and output. One value indicates the period T , while the other value provides the duration of the pulse of the first phase of the period t_{1p} . For frequency measurement, the measurement starts with the first rising edge, and finishes with the next rising edge. The falling edge that lies between them defines the end of the first phase. In pulse generator mode, output normally starts with a high level, changing to the low level when the first phase has elapsed.

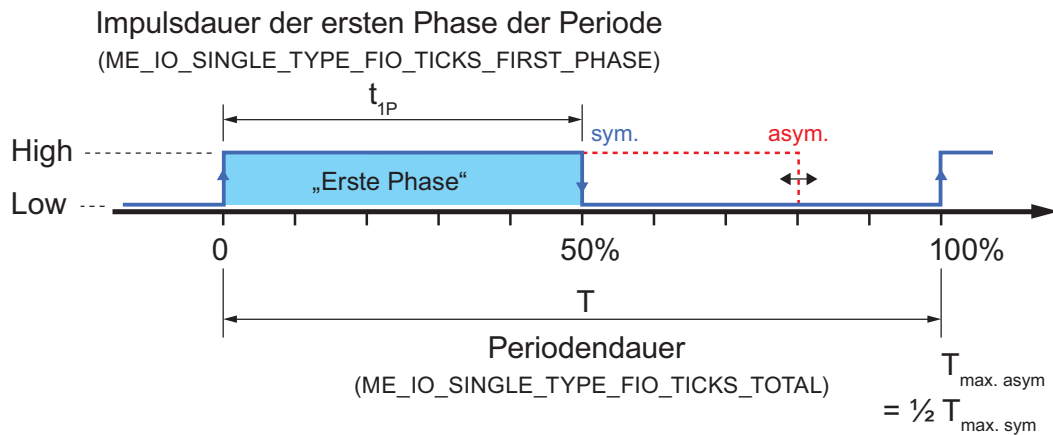


Diagram 17: Signal definition

The time reference is provided by a 66 MHz counter. It is configured using the *meIOSingleConfig()* function. A period of 15.15ns follows from this, and is defined as the smallest unit of time. It is referred to below as "1 tick". The resolution for T and t_{1P} is therefore 1 tick (see also the specifications on page 49).

Note that the value of the maximum period $T_{\max.}$ depends on the duty cycle. A distinction is drawn between rectangular signals with an asymmetrical duty cycle $T_{\max. \text{ asym.}}$ and a symmetrical duty cycle $T_{\max. \text{ sym.}}$.

The figures for the ME-5810 are:

$$T_{\max. \text{ asym.}} = 16.25\text{s} (0.06\text{Hz}); T_{\max. \text{ sym.}} = 32.5\text{s} (0.03\text{Hz})$$

The wiring of the frequency inputs/outputs can be found in chapter 3.6 on page 25.

4.1.2.1 Frequency Measurement

With the frequency measurement operating mode (FI= "Frequency Input") you can determine the period or frequency, and the duty cycle of rectangular signals up to 300 kHz. The resolution is 1 tick = 15.15 ns. The measurement always starts at a rising edge. On the ME-5810, all 4 frequency measuring channels (FI_A0...3) are addressed as subdevices of type ME_TYPE_FI, subtype ME_SUBTYPE_SINGLE. Each channel can be programmed independently.

In combination with the plug-on board ME-5002, 8 additional frequency measurement channels (FI_C0...7) are available which can be addressed as one subdevice.

Note: If the frequency and duty cycle are the magnitudes you want, these can easily be calculated from the values returned for <pdTime>. The formula is:

$$\text{Frequency [Hz]} = 1/\text{period [s]}$$

$$\text{Duty cycle [\%]} = (\text{"duration of the first phase of the period" [s]} / \text{period [s]}) \times 100$$

4.1.2.2 Pulse Generator

In the pulse generator operating mode (FO = "Frequency Output") you can output rectangular signals with a variable duty cycle at frequencies of up to 3 kHz and with a resolution of 1 tick. On the ME-5810, all 4 pulse generator channels (FO_B0...3) are addressed as subdevices of type ME_TYPE_FO, subtype ME_SUBTYPE_SINGLE. Each channel can be programmed independently.

The first phase of the rectangular signal is "high" by default. By setting the ME_IO_SINGLE_TYPE_FO_START_LOW flag it is also possible to start the output with a "low" level.

In combination with the plug-on board ME-5002, 8 additional pulse generators (FO_D0...7) are available, addressed as one subdevice.

Note: An output channel can also be read back!

4.1.3 Counters (8254)

ME-5810	ME-5001	ME-5002	ME-5004	
✓	--	--	--	

The programming of the counters is done in operation mode „**Single**“. A counter device of type 82C54 provides three 16 bit counters. Each counter is accessed as a subdevice of type ME_TYPE_CTR, subtype ME_SUBTYPE_CTR_8254. Note the order of operation as described in the ME-iDS manual and in the ME-iDS help file (see ME-iDS Control Center).

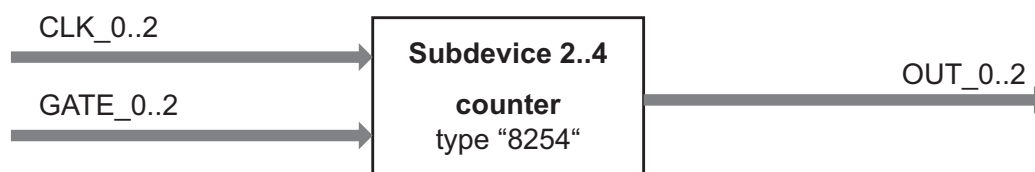


Diagram 18: Zähler-Betrieb im Single-Betrieb

4.1.3.1 Standard Operation Modes

The counters can be configured independently of each another by the function *meIOSingleConfig()* for the following 6 operation modes (a detailed description of the modes can be found in the ME-iDS manual):

- Mode 0: Change state at zero
- Mode 1: Retriggerable „One Shot“
- Mode 2: Asymmetric divider
- Mode 3: Symmetric divider
- Mode 4: Counter start by software trigger
- Mode 5: Counter start by hardware trigger

Beachten Sie die Beschaltung der optoisolierten Zählersignale, siehe Kap. 13 auf Seite 27.

Please read diagram 13 on page 27 for the wiring of the opto-isolated counter signals.

4.1.3.2 Pulse Width Modulation

With the wiring shown in diagram 14 on page 29 you can simplify programming considerably using the functions *meUtilityPWMStart/Stop* for this operation mode (see also ME-iDS manual and ME-iDS help file).

4.2 Streaming Operation Mode

4.2.1 Digital Input/Output

ME-5810	ME-5001	ME-5002	ME-5004	
"S" version	--	--	--	

The programming of the timer-controlled input/output via FIFO is carried out in the **streaming** operating modes. Port A is defined as 16 bit input port (subdevice 0 of type ME_TYPE_DI) and port B as 16 bit output port (subdevice 1 of type ME_TYPE_DO), each of subtype ME_SUBTYPE_STREAMING (only for versions "S").

Please observe the ME-iDS manual and the ME-iDS help file (*.chm) for the **procedure**. You can open both of these documents through the "ME-iDS Control Center" or through the Windows Start menu.

4.2.1.1 Stream Timer

In this operating mode the values are acquired or output under the control of a timer. A continuous transfer bandwidth between the PC and the ME-5810 of up to 30 MHz is available, shared among port A and B. You can sample a rectangular signal up to 300 kHz with up to 100 times oversampling. An output rate of up to 3 kHz is possible.

4.2.1.2 Stream Trigger Sample

In this operating mode individual values can be acquired or output under the control of one or more external trigger signals. A continuous transfer bandwidth between the PC and the ME-5810 of up to 30 MHz is available, shared among port A and B. You can sample a rectangular signal up to 300 kHz with up to 100 times oversampling. An output rate of up to 3 kHz is possible.

4.2.1.3 Wraparound Mode

This option is used for repetitive output of the very same data buffer on port B.

Note: When no more than 8192 values are to be output for an indefinitely long period, this is done on firmware level of the ME-5810 without loading the host computer.

4.2.1.4 External Trigger

On the „S“ versions the trigger conditions for starting and stopping the streaming operation mode can be selected very flexibly. It is thus possible to enable one or more trigger inputs individually, with specification of the desired trigger edge (rising, falling, or any). All the enabled trigger inputs are logically ORed together. This means that the first edge to arrive that meets the trigger condition starts or stops the input/output operation, according to the selected operation mode (stream timer or stream trigger sample). In other words, any change of the bit-pattern can be used as a trigger event for the subdevice concerned.

For subdevice 0 all inputs of port A (DI_Ax) can be used and for subdevice 1 all outputs of port B (DO_Bx) can be used, as they can be read back (see diagram 19).

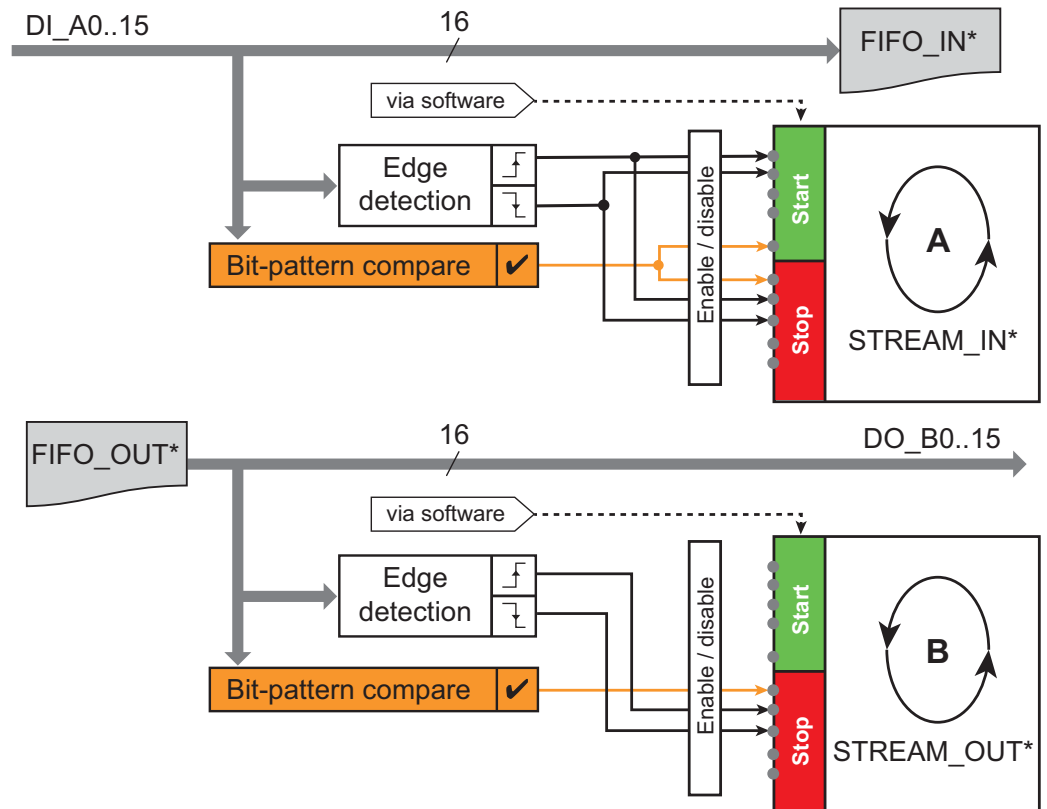


Diagram 19: Trigger in streaming operation mode

*Note: „FIFO IN“ and „FIFO OUT“ only available on „S“ versions.

4.3 Interrupt Operation

ME-5810	ME-5001	ME-5002	ME-5004	
✓	--	✓	✓	

On the board of the ME-5810 series you can monitor the bit-pattern of the 16 bit wide input ports of subdevice 0 of the base-board ME-5810 (DI_A0..15) as well as subdevice 0 of the plug-on board ME-5002 (DI_C0..15). Depending on the application you can select one of the operating modes “bit-pattern compare” and “bit-pattern change”. As soon as the first edge that meets the trigger condition arrives, an interrupt is issued and passed directly to the PC.

Programming the digital input/output is carried out in the operation mode single. The subdevice must have the type ME_TYPE_DI. The interrupt processing is controlled with the functions *meIOIrq...*

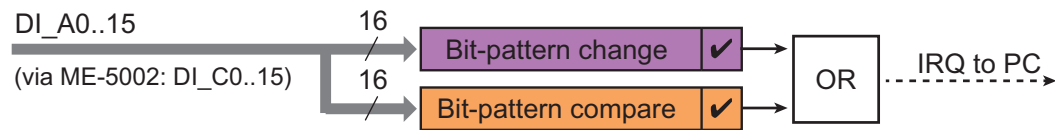


Diagram 20: Interrupt options

Please observe the ME-iDS manual and the ME-iDS help file (*.chm) for the **procedure**. You can open both of these documents through the "ME-iDS Control Center" or through the Windows Start menu.

4.3.1 Bit-pattern Change

In the bit-pattern change mode, one or more bits that are to be monitored for a change of state can be defined (masked). A 32 bit wide argument per subdevice contains the mask. For each input pin both one bit for rising edge and one bit for falling edge is available. If the state of at least one bit masked with a "1" changes ($0 \rightarrow 1$ or $1 \rightarrow 0$), an interrupt is issued (see diagram 21 on page 43).

In what is known as the "extended format" of interrupt handling (see the ME-iDS manual), two bits are available for the interrupt status of each pin. One is for the rising edge, and one for the falling edge. The bits for the falling edges are assigned to the bit b15...0, while the bits for the rising edges are assigned to the bits b31...16.

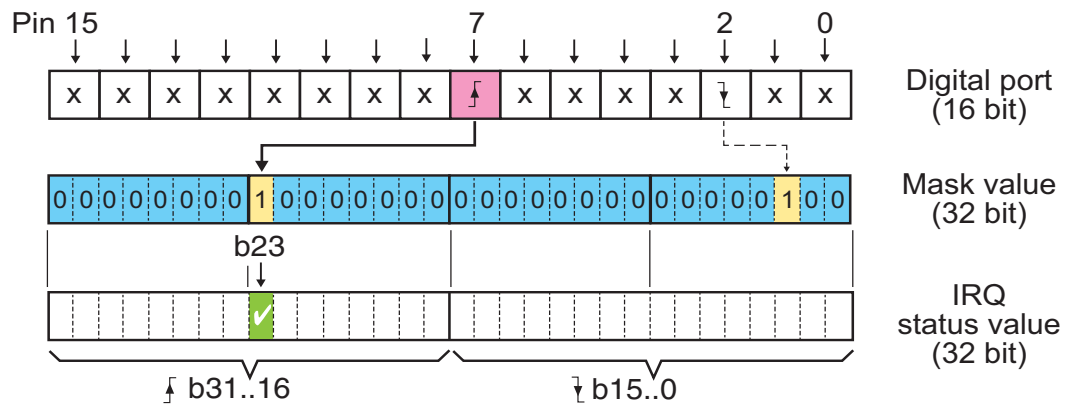


Diagram 21: Bit-pattern change

Example (see diagram 21):

By writing the value 00800004Hex as a mask value (see parameter `<iIrqArg>` of the function `meIOIrqStart()`), bit 2 is monitored for a falling edge, and bit 7 for a rising edge. A rising edge now is to arrive at bit 7, so that an interrupt is issued and in the interrupt status value bit b23 returns "1". Any edges that might arrive at pins labelled with an "X" are ignored. Only the change in state of a pin whose edge is set to "1" in the parameter `<iIrqArg>` can issue an interrupt.

The interrupt event is evaluated with the function `meIOIrqWait()`. We recommend using what is known as the "extended format" to obtain detailed information about the triggering edge.

4.3.2 Bit-pattern Compare

In the “bit-pattern compare” mode, the bit-pattern of digital inputs can be monitored for equality or inequality. The compare bit-pattern of the corresponding subdevice is used as reference. If the state changes from unequal to equal or from equal to unequal, an interrupt is generated (see diagram 22 on page 44).

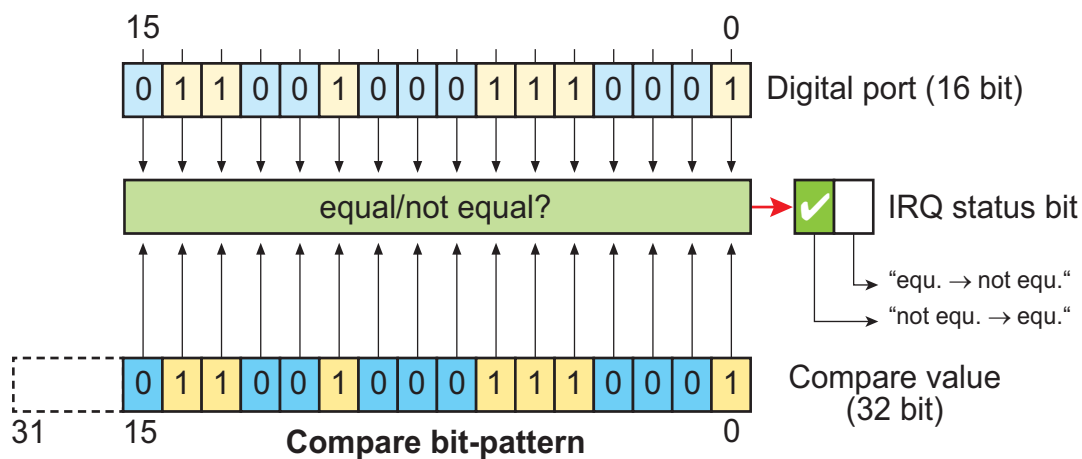


Diagram 22: Bit-pattern compare

Appendix

A Specifications

(Ambient temperature 25 °C)

PC Interface

PCI Express bus	32 bit, 33 MHz, 3.3 V, PCI Express x1, specification version 2.0
CompactPCI bus	32 bit, 33 MHz, 5 V, specification PICMG 2.0 R3.0
Plug&Play	is fully supported

Digital Input/Output (general)

Measured quantity	Condition/explanation	Value
Ports ME-5810 (base board)	Subdevice 0 (Single/Streaming)	16 bit input port opto-isolated
	Subdevice 1 (Single/Streaming)	16 bit output port opto-isolated
Ports ME-5002 (plug-on board)	Subdevice 0 (Single)	16 bit input port opto-isolated
	Subdevice 1 (Single)	16 bit output port opto-isolated
Operation modes	Single	Software triggered read/write
	Stream Timer	Timer controlled read/write of values via FIFO
	Stream Trigger Sample	Timer controlled read/write of values via FIFO
	Interrupt	Bit-pattern change, Bit-pattern compare
FIFO size	FIFO_IN	8192 values (16 bit wide)
	FIFO_OUT	8192 values (16 bit wide)
Transfer rate in streaming mode	between ME-5810 and PC	max. 25 MHz (cPCI) resp. 30 MHz (PCIe) (system-dependent)
Frequency input signal	symmetrical rectangular signal	max. 300 kHz
Frequency output signal	symmetrical rectangular signal	max. 3 kHz
	Option „Wraparound“	max. 3 kHz, without load for the PCs
Timer (CHAN-Zeit)	Input	30.30ns...65s (2..FFFFFFFFHex Ticks)
	Output	0.15ms...65s (11000..FFFFFFFFHex Ticks)
Timer resolution	programmable	15.15ns (1 Tick)
Ext. trigger inputs	ME-5810	DI_Ax, DO_Bx
Ext. trigger edges		rising, falling, any
Input level	see the following tables	

Measured quantity	Condition/explanation	Value
Isolation voltage	U_{ISO} (f = 60 Hz, t = 60 s)	max. 1000 VAC _{rms}
Massebezug	von PC-Masse entkoppelt	GND_EXT

Opto-isolated Inputs

Static values

Conditions: $T_A=25^\circ\text{C}$

Measured quantity	Test criterion	MIN	Typ	MAX	Unit
$U_{\text{in,H}}$		12	24	30	V
$U_{\text{in,L}}$		0		2.2	V
R_{in}	$U_{\text{in}}=24\text{V}$		4.5		k Ω
I_{in}	$U_{\text{in}}=24\text{V}$		5.5		mA

Limiting values

Measured quantity	Condition/explanation	Value
U_{RWM} over-voltage protection for inputs	max. 600 W pulse power at a pulse width of 1 ms	30V

Opto-isolated Outputs

Conditions: $T_A=25^\circ\text{C}$

Output drivers	Sink	2 x ULN2803 (ME-5810A)
		+ 2 x ULN2803 (ME-5002)
	Source	2 x ISO1H811G (ME-5810A)
		+ 2 x ISO1H811G (ME-5002)
External supply	U_{ext}	15...30V
	U_{Lmax}	U_{ext}

For further specifications see chapter sink driver resp. source driver

Sink Driver (UDN2803)

Measured quantity	Test criterion	MIN	Typ	MAX	Unit
I_{Out}=I_C (output current)	per channel			50	mA
	see also characteristics curves in diagram 23				
I_{CEX} (output leakage current)	U _{CE} =50V, T _A =25°C U _{CE} =50V, T _A =85°C			50 100	µA
U_{CE(SAT)} (collector emitter saturation voltage)	I _{Out} =350mA I _{Out} =200mA I _{Out} =100mA		1.3 1.1 0.9	1.6 1.3 1.1	V
I_R (clamp diode reverse current)	U _R =50V, T _A =25°C U _R =50V, T _A =85°C			50 100	µA
U_F (clamp diode forward voltage)	I _F =350mA			2.0	V
t_{on} (switch-on time)	R _L =125Ω, U _{out} =50V, C _L =15pF		0.1	1	µs
t_{off} (switch-off time)	R _L =125Ω, U _{out} =50V, C _L =15pF		0.2	1	µs

Output current

The maximum current per output (I_C) depends of the saturation voltage U_{CE} and is limited by the power dissipation of the sum of the channels to P_{tot} = 1 W per chip:

$$P_{\text{tot}} = P_0 + \dots + P_7 \leq 1\text{W (at } 70^\circ\text{C)}$$

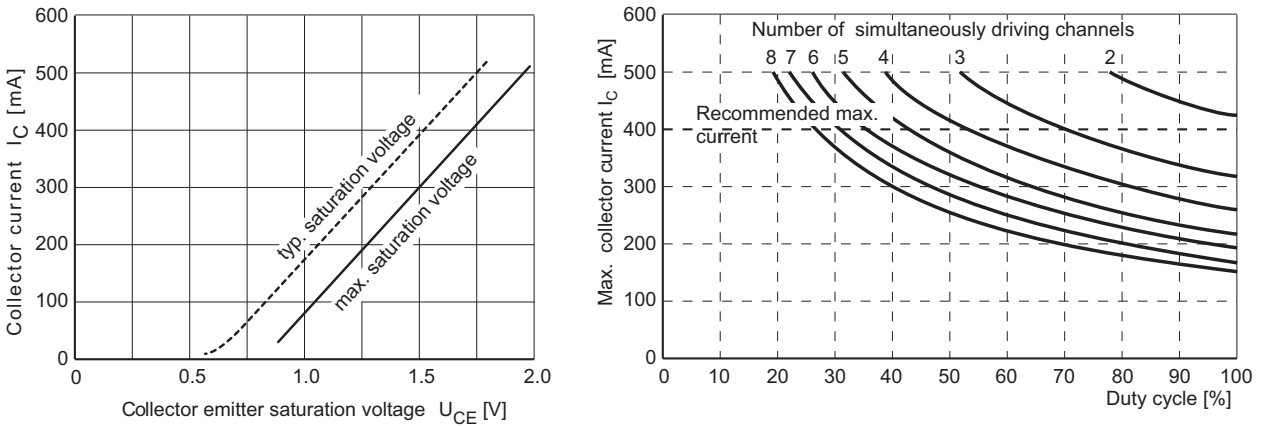


Diagram 23: Characteristic curves UDN2803

Source Driver (ISO1H811G)*(short-circuit proof with current limiting and temperature monitoring)***Voltage supply**Conditions: $U_{\text{ext}} = 15 \dots 30 \text{ V}$, $T_J = -25 \dots +125^\circ\text{C}$

Measured quantity	Test criterion	MIN	Typ	MAX	Unit
U_{out}	$U_{\text{ext}} = 24\text{V}$; 1 channel with $I_{\text{out}} = 0.625\text{A}$		23.8		V
I_{Out} /channel	1 channel			625	mA
	16 channels			370	mA
	32 channels (with ME-5002)			180	mA
U_{USD} (undervoltage shut-down)		7		10.5	V
R_{ON} (resistance if output active)	$I_{\text{out}} = 0.5\text{A}$; $T_J = 25^\circ\text{C}$		150	200	$\text{m}\Omega$
	$I_{\text{out}} = 0.5\text{A}$; $T_J = 125^\circ\text{C}$		270	320	$\text{m}\Omega$
I_S (current consumption driver chip)	8 channels active per chip; without load		10	14	mA
$I_{L(\text{off})}$ (output current in inactive state)	$U_{\text{in}} = U_{\text{out}} = 0\text{V}$	0	5	30	μA

Switching times

Measured quantity	Test criterion	MIN	Typ	MAX	Unit
t_{on} (switch-on time)	$R_L = 47\Omega$, bis 90% U_{out}		64	120	μs
t_{off} (switch-off time)	$R_L = 47\Omega$, bis 10% U_{out}		89	120	μs
$dU_{\text{out}}/dt_{(\text{on})}$ (slope on switch-on)	$R_L = 47\Omega$, von 10..30% U_{out} , $U_{\text{ext}} = 15\text{V}$		1	2	$\text{V}/\mu\text{s}$
$dU_{\text{out}}/dt_{(\text{off})}$ (slope on switch-off)	$R_L = 47\Omega$, von 70..40% U_{out} , $U_{\text{ext}} = 15\text{V}$		1	2	$\text{V}/\mu\text{s}$

Limiting values

Measured quantity	Test criterion	MIN	Typ	MAX	Unit
T_{CSD} (housing switch-off temperature)		125	130	135	$^\circ\text{C}$
T_{CR} (housing reset temperature)		110			$^\circ\text{C}$
T_{TSD} (junction switch-off temperature)		150	175	200	$^\circ\text{C}$
T_R (junction reset temperature)		135			$^\circ\text{C}$
I_{lim} (DC short-circuit cur.)	$U_{\text{ext}} = 24\text{V}$, $R_L = 10\text{m}\Omega$		1.1		A

Frequency Input/Output

Availability	Alternative subdevice configuration via ME-iDC
Signal form	Rectangular

Frequency measuring channels

Measured quantity/criterion	Condition/explanation	Value
Reference ground	isolated from PC ground	GND_EXT
Number of channels	ME-5810A (FI_A0...3)	4 inputs (opto-isolated)
	ME-5002 (FI_C0...7)	8 inputs (opto-isolated)
Input level		see digital I/O
Input current		see digital I/O
Period (T)	$T_{\min.} = T_{\min. \text{ asym.}} = T_{\min. \text{ sym.}}$	$3.\overline{3}\mu\text{s}$ (300kHz)
	$T_{\max. \text{ asym.}}$	16.25s (0.06Hz)
	$T_{\max. \text{ sym.}}$	32.5s (0.03Hz)
Duty cycle	Variable, depending on T	Measurable in steps of 1 tick
Resolution	1 tick	$15.\overline{15} \text{ ns}$
Accuracy		$\pm 15.\overline{15} \text{ ns}$
Operating modes		Single

Pulse generator channels

Measured quantity/criterion	Condition/explanation	Value
Reference ground	isolated from PC ground	GND_EXT
Number of channels	ME-5810A (FO_B0...3)	4 outputs (opto-isolated)
	ME-5002 (FO_D0...7)	8 outputs (opto-isolated)
Output level	Sink- oder Source-Treiber	see digital I/O
Period (T)	$T_{\min.} = T_{\min. \text{ asym.}} = T_{\min. \text{ sym.}}$	0. $\overline{3}$ ms (3kHz)
	$T_{\max. \text{ asym.}}$	16.25s (0.06Hz)
	$T_{\max. \text{ sym.}}$	32.5s (0.03Hz)
Duty cycle	Variable, depending on T	to be set in steps of 1 tick
Resolution	1 tick	$15.\overline{15} \text{ ns}$
Accuracy		$\pm 15.\overline{15} \text{ ns}$
Operating modes		Single

Counters

Number	3 x 16 bit (1 x 82C54)
Opto-isolation	yes (dimensioning of the I/O level for 24V)
Counter clock	up to 10 MHz by external source

...with opto-isolation

Measured quantity/criterion	Condition/explanation	Value
Reference ground	isolated from PC ground	GND_EXT
External supply for opto-couplers	U _{ext}	24..30V
Level for counter outputs (OUT_x)		
Type		„Open Collector“
U _{Lmax}		U _{ext}
I _{Out}		max. 30mA
Level for counter inputs (CLK_x, GATE_x)		
Logic level	Inverted by opto-couplers	low active
I _F		7.5mA ≤ I _F ≤ 10mA
U _{IL}		max. 0.8V
U _{IH}		24..30V, max. U _{ext}

Interrupt

Measured quantity/criterion	Condition/explanation	Value
Interrupt sources	Passed directly to the PC	Bit-pattern change Bit-pattern compare

General Data

Measured quantity/criterion	Condition/explanation	Value
Power supply	CompactPCI	+5 V (via PCI bus)
	PCI Express	+3.3 V (via PCIe bus), +5 V (via Molex plug from PC power supply unit)

Measured quantity/criterion	Condition/explanation	Value
Current consumption	CompactPCI	0.8...1.2 A (full load)
	PCI Express	0.8...1.2 A (full load)
Board dimensions (without slot bracket and connector)	CompactPCI	3 U CompactPCI board
	PCI Express	162 mm x 98 mm
Connections	ST1	78-pin D-sub female socket
	I/Os of ME-5002	via ST1 of base board
Operating temperature		0...70 °C
Storage temperature		-40...100 °C
Air humidity		20...55% (non-condensing)

CE Certification

EU directive	89/336/EMC
Emission	EN 55022
Immunity	EN 50082-2

B Pinout

Note: „ME-5810“ represents all models of the ME-5810 series.

Legend for pinouts:

DI_A0..15	Digital inputs of ME-5810 (subdevice 0)
DO_B0..15	Digital outputs of ME-5810 (subdevice 1)
DI_C0..15*	Digital inputs of ME-5002 (subdevice 0)
DO_D0..15*	Digital inputs of ME-5002 (subdevice 1)
CLK_0..2	Clock inputs for counters
GATE_0..2	Gate inputs for counters (low-active)
OUT_0..2	Counter outputs (type “open collector”)
FI_A0..3	Frequency measurement inputs of ME-5810 (subdevice 0, alternative configuration)
FO_B0..3	Pulse generator outputs of ME-5810 (subdevice 1, alternative configuration)
FI_C0..7*	Frequency measurement input of ME-5002 (subdevice 0, alternative configuration)
FO_D0..7*	Pulse generator output of ME-5002 (subdevice 1, alternative configuration)
VCC_EXT	VCC input for ext. power supply of isolated ports, U _{ext} typ. 24 VDC
GND_EXT	Reference ground for isolated ports (isolated from PC ground)

Note: In the configuration “pulse generator” (FO) don’t forget to take care of the unused pins DO_B4..15 (ME-5810) and DO_D8..15 (ME-5002). When used as sink drivers they are in high impedance state, when used as source drivers they are connected to ground!

* These signals are only available in combination with the plug-on board ME-5002 (note: ME-5810B = ME-5810 + ME-5002).

B1 78-pin D-Sub (ST1) – ME-5810

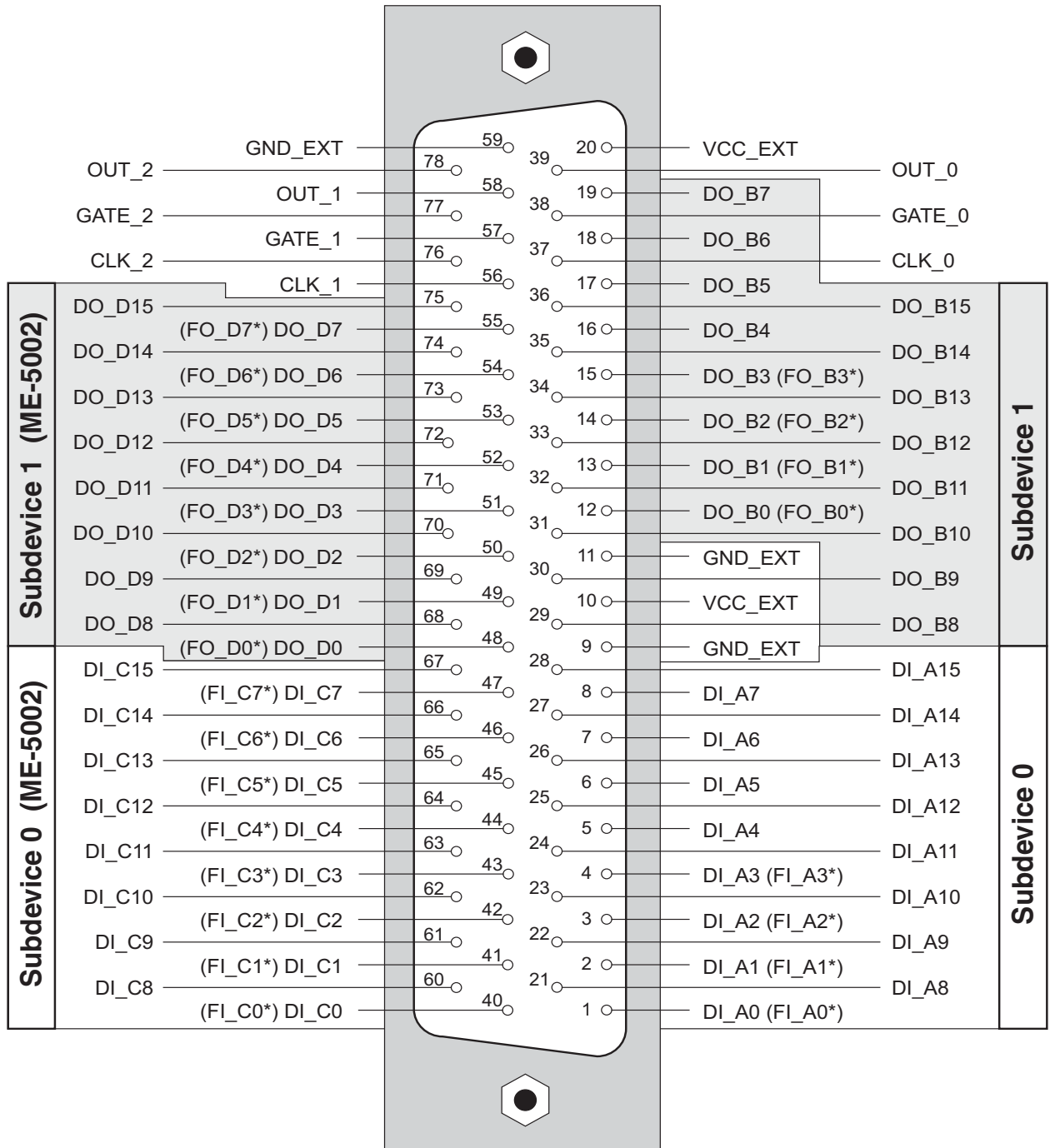


Diagram 24: 78-pin D-sub female connector ME-5810 (ST1)

* These pins can only be used as frequency measurement inputs (FI_x) resp. pulse generator outputs (FO_x) after appropriate configuration of the corresponding subdevice with the ME-iDC. The remaining pins of the digital ports cannot be used for digital-I/O.

C Accessories

We recommend the use of high-quality connecting cables with a largely calculated cable cross-section.

ME-AK-D78/x

Standard connecting cable (1:1) from 78-pin D-Sub male connector to 78-pin D-Sub female connector, various lengths.

ME-AB-D78M

Terminal block with 78-pin D-sub male connector

ME-63Xtend series

External relay and digital I/O boards (suitable for DIN rail mounting). Can be connected via the plug-on board ME-5001.

ME-UB series

Desktop relays and digital I/O boxes. Can be connected via the plug-on board ME-5001.

Further accessories can be found in the current Meilhaus Electronic catalogue, or on the Internet under www.meilhaus.de

D Technical Questions

D1 Hotline

If you should have any technical questions or problems that can be put down to your Meilhaus device, please send a fax to our hotline:

Fax hotline: + 49 (0) 89/89 01 66 28

eMail: support@meilhaus.de

Please give a full description of the problems and as much information as possible, including operating system information.

D2 Service address

If a technical error should occur with your device please contact us at the following address:

Meilhaus Electronic GmbH

Service Department

Fischerstraße 2

D-82178 Puchheim/Germany

If you want to send back a device to be repaired it is strictly necessary to request for a RMA number and to follow the notes to deal with the RMA process. Please attach a detailed error description of the problem, including information about operating system and application software!

D3 Driver Update

The current driver versions for Meilhaus devices and our manuals in PDF format are available under www.meilhaus.com.

E Index

A

- Accessories 54
- Acquisition
 - timer-controlled 40

B

- Bit-pattern Change 42
- Bit-pattern Compare 44
- Block diagram 17

C

- Counter
 - Programming 38
 - Wiring 27

D

- Digital Input/Output
 - Programming 34, 40
 - Wiring 20
- Driver Update 55

E

- External Interrupt 29
- External Trigger 25

F

- Features 8
- Frequency Input/Output
 - Programming 35
 - Wiring 25
- Frequency Measurement 25, 36

H

- Hardware description 17

I

- Interrupt
 - Programming 42
 - Wiring 29

- Introduction 5

O

- Operation Modes
 - Frequency Measurement 36
 - Interrupt 42

- Pulse Generator 37
- Single Operation 34
- Streaming Operation 40
- Wraparound Mode 40
- Opto-isolated Inputs 20
- Opto-isolated Outputs 21

P

- Pinout 52
- Plug-on boards 11
- Power supply 15
- Programming
 - Bit-pattern Change 42
 - Bit-pattern Compare 44
 - Counter 35, 38
 - Frequency Input/Output 35
 - Interrupt 42
 - Pulse Width Modulation 39
 - Single Operation 34
 - Streaming Operation 40
- Pulse Generator 25, 37
- Pulse width modulation 28

S

- Scope of supply 7
- Service and Support 55
- Single Operation 34
- Sink Driver 21
- Software support 12
- Source Driver 23
- Specifications 45
- Streaming Operation 40
- Systemanforderungen 12

T

- Test program 13
- Trigger edges 25

W

- Warnings 5

Wiring

of digital inputs 20

of digital outputs 21

of the counters 27